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THE SATELLITE ROCKET VEHICLE: POLITICAL
AND PSYCHOLOGICAL PROBLEMS

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THE SATELLITE ROCKET VEHICLE: POLITICAL AND PSYCHOLOGICAL PROBLEMS

SUMMARY

The paper deals with the probable political effects resulting from the launching of a satellite vehicle under United States auspices, and from its successful use for purposes of military intelligence. The main questions discussed are: (a) How is the satellite program likely to affect the foreign audiences' image of United States capabilities and intent? (b) What influence may it be expected to have on Soviet political behavior? Tentative conclusions include a recommendation of advance publicity rather than secrecy, as well as the launching of a first experimental satellite over the Equator prior to launching a second one on an oblique orbit to be used for intelligence purposes. It is argued that this course is likely to minimize the risks inherent in possible Soviet countermeasures.

INTRODUCTION

A. Summary Description of a Satellite Vehicle

1. It is today possible to manufacture and launch a missile from the surface of the earth to an altitude where the centrifugal forces of the missile will counterbalance the force of gravity, so that the missile will revolve around the earth in predetermined orbits. Such a missile or vehicle would be a man-made satellite, a 'little moon,' circling the earth for a certain period of time.

A number of technical reports on the satellite vehicle have been published by RAND.

2. Study of the problem has led to the following conclusions concerning the basic properties of the satellite:

- a) Depending on the initial impulse, the satellite can be made to revolve at several hundred miles upward. A satellite revolving at an altitude of 350 miles will continue to circle the earth for about two years. The density of the atmosphere at 350 miles will cause it to lose altitude continually. When the altitude is down to 100 miles, a state expected to be reached in about two years, atmospheric drag will be sufficient to bring the vehicle down to earth in less than one revolution.
- b) Its speed would have to be about five miles per second to make sustained revolution in fixed orbits possible. At an altitude of 350 miles, the satellite would make a complete revolution around the earth in about one and one-half hours.
- c) The following types of orbits can be chosen for the satellite:
 - (1) parallel to the equator;
 - (2) on an oblique axis;
 - (3) on a north-south axis, passing over the north and south pole on each revolution.A satellite moving parallel to the equator will remain constantly in the same orbit relative to the earth, passing over the same points each time it revolves. A satellite launched on a fixed oblique orbit would "cover" the surface of the earth between two fixed latitudes, crossing and recrossing the equator obliquely in each revolution. Owing to the rotation of the earth, the points of crossing would be at fixed intervals from each other, so that with each revolution the satellite would pass over a different set of points over the surface of the earth. These different trajectories would be farthest apart (at a distance of about 1500 miles) at the equator and banded more closely together

RA-15021*	Flight Mechanics of a Satellite Rocket
RA-15022	Aerodynamics, Gas Dynamics and Heat Transfer Problems of a Satellite Rocket
RA-15025	Stability and Control of a Satellite Rocket
RA-15026*	Structural and Weight Studies of a Satellite Rocket
RA-15027	Satellite Rocket Power Plant
RA-15028*	Communication and Observation Problems of a Satellite
RA-15029*	Study of Launching Sites for a Satellite Projectile
RA-15032	Reference Papers Relating to a Satellite Study
R-105	Analysis of Temperature, Pressure and Density of the Atmosphere Extending to Extreme Altitudes
R-217	A Satellite Rocket for Reconnaissance
R-218	Inquiry Into the Feasibility of Weather Reconnaissance From a Satellite Vehicle

The items marked by asterisks are particularly informative.

as the extreme latitude of the satellite is approached. A satellite placed on a north-south axis would describe, in each revolution, a curvilinear path between the two poles of the earth, each successive path being about 15° to the west of the preceding one.

- 1) Thus, a satellite placed on an oblique orbit could scan the entire surface of the globe, except the polar regions. If a television apparatus is placed in the satellite, it can make, in each revolution, a pictorial record of a band of the earth's surface of a width of about 1500 miles to the left and right of its trajectory. The record can be picked up by television signal from any point within the same band.
- 2) The payload of a satellite could not exceed a few hundred pounds. Hence, it is not feasible at present to manufacture satellites with explosive (atomic) warheads. Signal transmitting apparatus (e.g., television equipment) seems to be the most practicable payload.
- 3) The energy needed to operate any transmission facility carried by the satellite probably could be provided by a radioactive heat cell. This could be in continuous operation for about one year, but the performance would deteriorate as the energy ran out. Studies of the radioactive equipment have been under way for several years and a report is being published.* Alternative possibilities are chemical fuels (limited by the amount that can be carried) and solar energy (limited by the amount of collecting surface that can be provided).
- 4) A satellite painted white would be visible to the naked eye at certain times, i.e., when the sky is dark but the satellite is illuminated by the sun's rays. The maximum duration of visibility at any given time would be about four minutes. Visibility would be about the same as that of a fourth magnitude star. The satellite could not be seen by the naked eye either during the daytime or at night: it is visible for short periods after sunset and before sunrise. Higher visibility might be achieved by erecting reflectors from the vehicle, trailing it in its orbit. A black satellite would be invisible to the naked eye.

3. Communication Facilities of a Satellite

A satellite could be equipped with radio and television apparatus. Such a payload could be used in the following ways:

- a) As a radio relay station: The satellite could serve as a 'secure' relay point for communication (two-way) between points where it was necessary to maintain radio silence. A submarine or surface craft, for instance, could radio a message to the satellite, which the vehicle could then transmit to other ships or to a receiving station on the earth. The messages would be sent by microwaves, which would have to penetrate the ionosphere. It would be extremely difficult to monitor such messages. The

messages, however, could be transmitted only in the line of sight; they could not get around the curvature of the earth's surface by being reflected. Maximum line-of-sight distance from the earth's surface to the satellite at 350 miles altitude is roughly 1500 miles, so that under ideal conditions two ground stations 3000 miles apart could communicate briefly with each other. For higher satellite altitudes or delayed transmission of messages the range would be increased.

- b) As a broadcasting station: It is feasible to equip the satellite with a small-energy transmitter (about seven watts), from which messages could be picked up. A satellite might be used to relay radio messages sent from ground stations. Several satellites might act together as a relay system for 'secure' broadcasts. Since microwaves would be used, the satellite could probably handle a very large number of independent channels successfully, with relatively simple equipment.
- c) As a television station: As already indicated, the satellite could transmit, by television signal, a pictorial record of a wide band of the earth's surface along its trajectory. Such use of a satellite vehicle has been studied for several years, and a report is now in preparation indicating that television reconnaissance satellite would be highly valuable. This record could be picked up by suitably placed ground stations. In this way, a direct pictorial record of otherwise inaccessible regions could be obtained. Such pictorial information would be useful for purposes of meteorological analysis, or for reconnaissance. It should be noted that if transmission is simultaneous with the recording of the picture, the receiving station must be within the maximum line-of-sight cone originating from the satellite, the base of which has a radius of 1500 miles. If delayed transmission can be arranged, the station picking up the television signal can be located at a greater distance from the area televised. (However, the feasibility of delayed transmission is uncertain, and the amount of information would be drastically reduced at best.) Clarity of the pictures transmitted would be sufficient to reveal objects down to the size of half a city block, provided their contrast with the surrounding area is sharp enough. Improved telescopic lenses and television tubes, and advances in television research now under way, may provide even greater definition of detail. The reception of images televised from a satellite would require a directional antenna rotating to follow the satellite. Since the signals follow the line of sight, they could not be jammed. With present techniques television operations would be limited to daytime.
- (d) As a relay station for guiding long-range missiles: The satellite might conceivably be used to correct the trajectory of a guided missile, although further study would be needed to determine whether it could be usefully employed for this purpose. Such use would require that the two travel along parallel orbits; the firing of the missile would have to be so timed that the satellite (traveling at a much higher speed) would overtake it somewhere near the target and correct any deviation from the intended course. Progress in guided missile precision would

indicate that it will not be necessary to rely on the satellite vehicle for this.

- a) As a pioneering development for interplanetary travel: Once a satellite program is successfully carried out, the problem of how to bring a satellite back to earth safely could be studied experimentally. When this problem is solved, interplanetary travel will become feasible in principle, depending only on the production of satellite vehicles of larger size and greater performance. However, certain physiological questions must be answered before we can be sure that true 'interplanetary' travel is possible; it is problematical whether man can live outside a gravitational field.

2. Cost and Time Requirements

1. It is estimated that the cost of a satellite vehicle program, providing for the launching of four vehicles, would be of the order of about \$50 million. This does not include the cost of ground installations, or of the actual launching and tracking operations.

2. It is estimated that the completion of such a program would take about five years; it could be completed in shorter time, if a concentrated effort were made. Further work on improving the performance of the satellite and solving the problem of recovery might bring travel in the interplanetary space within sight in about 10 years.

NOTE: A French writer who studied the problem of interplanetary travel reached the following conclusions: If atomic energy could be utilized for propulsion, interplanetary travel would be possible, but one cannot yet say whether the technological difficulties can be solved.

New isothermic tubes ought to be invented for this purpose, capable of functioning at fifty times the speed of sound; new substances showing good mechanical resistance at high temperatures ought to be developed, and safe uranium piles, neither exploding nor endangering human beings by radiation, ought to be available. Hence, it does not seem that mankind has already entered upon the era of interplanetary navigation, even if it will one day. As to travelling to the moon, that may be feasible at an earlier date, although it is still not too likely.

Robert Richard-Foy, *Voyages interplanétaires et énergie atomique*, Paris, Albin Michel, 1947, p.59.)

1. THE SATELLITE AND NATIONAL SECURITY

1. What would be the peacetime and wartime utility of a satellite vehicle program for United States national defense?

2. The foregoing outline of the capacities and possible uses of satellites indicates that they cannot be considered as 'weapons' in the strict sense of the word. The possible uses mentioned, however, are definitely relevant to national security. For instance, strategic and meteorological reconnaissance of the kind that could be obtained from the satellite would be of high military value. It is important to note, in this connection, that the reconnaissance data that can be gathered through this instrumentality could not be obtained from any other source: the satellite would have access to visual data outside the range of other data-gathering facilities. The satellite, in fact, would add a new dimension to reconnaissance activities; it would be a novel and unconventional instrument of reconnaissance.

3. The addition of novel and unconventional facilities to the military system of a country, whether violent or not, is likely to be seen by others primarily in terms of a change in the existing balance of strength. It represents, in this sense, a political problem, as soon as it becomes known to the outside world. Whatever use we make of a satellite vehicle, its very novelty, the fact that it opens up avenues of action lying in a new dimension and not as yet available to other nations, stamps it as a political problem. This makes it necessary to explore the political and psychological implications of the introduction of the satellite.

"Unconventionality" is, of course, a relative term: what is unconventional today may become conventional tomorrow, as soon as it is incorporated into the action patterns of all. Before this is accomplished, however, the existence of unconventional facilities is fraught with political problems.

4. To determine the place of a satellite program in a military system, we must deal not only with its technical utility, but also with its political-psychological effects. The present paper is primarily concerned with these effects. It will be shown that the satellite has political and psychological utilities and disutilities independent of its technical utilities and disutilities. This means that careful attention must be paid to maximizing the political utilities and minimizing the political disutilities of the satellite program in fitting it into our defense system.

5. Because of the political implications of the satellite instrument, it is of prime importance what we say about it, in addition to what we do with it. If complete secrecy about the very existence of the satellite could be maintained, it could be kept out of the political sphere altogether. But such complete secrecy might be difficult to maintain for long; besides, since we could derive some political advantage from the satellite, we would want appropriate information about it to reach the outside world. We shall discuss some of the problems which arise in connection with the planning of public information concerning the satellite.

5. Two broad groups of problems deserve particular attention with regard to the political effects of the possession and use of the satellite: its effects on public and official opinion, and the political moves other governments may take in response to its use.

II. THE SATELLITE AND FOREIGN OPINION

A. The Basic Dimensions: Capability and Intent

1. Effects upon foreign opinion (which may be 'public' or 'elite' opinion) may include the way in which a certain act or event—in our case, the launching or use of a satellite instrument—affects the image other people have of the United States.

2. Shifts in the foreign image of the United States may be considered in terms of two basic dimensions: capability and intent imputed to the United States. That is, we are interested in knowing how certain events and actions surrounding the use of the satellite will influence other people's estimate of our capabilities and our intentions.

3. Estimates of United States capabilities may shift along a continuous scale, running from the pole of 'weakness' to the pole of 'strength.' As to estimates of intent, we are interested, in this analysis, primarily in shifts along a scale running from the pole of 'extreme yielding' to 'extreme aggressiveness.' This scale may be conveniently divided into three zones: (a) the zone of extreme conflict-avoiding behavior, to the extent of failure to protect legitimate interests of the United States and its allies ('appeasement'); (b) the zone of resolute defense of legitimate interests without undue aggressiveness; (c) the zone of provocative aggressiveness beyond the defense of legitimate interests.

4. What should be our information objectives with regard to *potentially friendly* audiences (allies)? It seems clear that, by and large, changes in the image of the United States in the direction of greater strength are desirable, with the qualification that the impression of greater strength should be associated with an estimate of intent lying somewhere in zone (b), "resolute defense of legitimate interests." This is not the place to go into the methods of reaching this objective, but one aspect of the problem should be mentioned. It would appear desirable in this context to avoid creating the impression that the United States is solely interested in, and preoccupied with, the development of maximum strength in terms of mass destruction weapons. Although it is true that a pure "atomic" strategy and diplomacy can be harnessed to a conservative policy of defending legitimate interests, we must remember that, in Europe, atomic weapons are associated in the public mind with aggressiveness, lack of responsibility, and disregard for the survival of civilization. They offer Europeans, by and large, no real hope.

5. Similar considerations apply to the image of the United States entertained by *neutral* audiences. In fact, we cannot draw a firm line between "neutrals" and "allies," since in the present bipolar situation the position of all neutrals is precarious; all may be faced with a Soviet attack which would make them dependent on Western help.

6. A somewhat different approach seems to be required in planning information strategy toward a *potentially hostile* audience, which, for practical purposes, may be identified with the Soviet ruling group. No doubt, it would be desirable to give the Soviet leadership an image of superior United States capability, together with an image of United States determination to defend only legitimate interests. It seems very

unlikely, however, that the Soviet leaders could ever be induced to accept such an image. For them, foreign strength always implies potential destructive action, and they seem unable to admit that interests conflicting with theirs and defended against them can be 'legitimate.' We must accept the fact that our strength will be interpreted by them as aimed at their destruction. This does not mean, of course, that we should minimize our own strength or appear weaker than we are, for this might invite attack. The most desirable situation seems to be one in which the Soviet leaders are convinced that the West has overwhelming strength--so that they would 'naturally' expect an attack upon themselves--without such an attack actually materializing. Here again, we cannot go into further detail about political implications: for the present analysis, it is sufficient to note, first, that the maintenance of a high Soviet estimate of United States capability seems to be an essential objective for us, and second, that there seems to be no reliable way of transmitting to the Soviet leadership an adequate picture of our intentions. On the other hand, specific demands can be reliably transmitted: this, however, is a matter of diplomacy rather than of information policy.

7. Finally, the 'time profile' of shifts in the foreign image of United States capabilities and intent must be borne in mind in shaping optimum information strategy. It would be wrong to maximize momentary advantages, if it is likely that the advantage cannot be maintained. For instance, a temporary lift in the morale of a friendly audience may be more than offset by the ensuing letdown, if the expectations aroused turn out to have been illfounded.

3. Probable Effects

1. We shall now consider the probable effect of the announcement of the launching of a satellite vehicle upon the image of the United States entertained by foreign audiences.

2. The successful launching of a satellite instrument is bound to be a spectacular event, causing a worldwide sensation.

It might be possible to estimate the probable reaction to an announcement of this nature by studying the reaction of the world press to Secretary Forrestal's reference to the satellite in his Report on the Unification of Services, December, 1948. In connection with another study, the present writer went through the files of three French newspapers, *Combat*, *Carrefour* and *Liberation*, covering the period in question. All three referred to the satellite announcement. *Carrefour* (Jan. 3, 1949) merely published a factual dispatch under the headline: "Will America possess Moons of War?" *Combat*'s headline was: "Will the Elbe frontier be defended from the Moon?" (Dec. 30, 1948). The dispatch quoted Secretary Forrestal as referring to an "atomic satellite vehicle," defining it as an "interstellar military station suspended in the sky like a small 'moon.'" A "nonofficial source" was quoted as suggesting that the satellite could be a "platform revolving around the earth at one-tenth of the distance to the moon." *Liberation* (a pro-Communist paper) gave the news the most extensive treatment. The story itself was accompanied by an interview with the "astronaut" Ananoff (Jan. 3, 1939). This source ridiculed the reports and characterized them as part of a "campaign calculated to terrorize the peoples."

3. We may assume, tentatively, that the reaction of the foreign press to any future announcement of the launching of a satellite would be similar in kind. There would be much speculation about the military value of the satellite as an instrument of destruction, or at least as a first step toward the development of a novel and terrible kind of weapon. What effect upon the foreign image of United States strength and intent can we expect from this?

4. First, in the *friendly and neutral world*: Much higher estimate of United States strength, but of a 'transitory' kind. For in time, the exaggerated speculations about the satellite as a weapon would die down; it would become clear that, sensational as the new development is, it does not alter the weapons picture. As a proof of United States technological and economic strength, it will be impressive. As regards United States intent, the first reaction will increase estimates of aggressiveness. The satellite may *transitorily* evoke the image of a United States relentlessly engaged in developing more and more radical means of global destruction.

5. Second, *Behind the Iron Curtain*: it is unlikely that the news will be suppressed, since it would be sensational enough to spread from outside sources. We can expect a flood of rumors and speculation, as well as a certain amount of public, propagandistic comment. It would be rash to predict the official "line" of propaganda: possibly, it would seek to minimize the achievement and characterize the satellite as a kind of stunt; it also may use it as an illustration of megalomaniac, destructive thinking within the United States leadership. Commenting on an article by the Alsop brothers on guided missiles M. Rubenstein, writing in *New Times*, 10 December, 1947, attacked the American use of "Hitlerite ideas and technicians" with special sarcasm toward the "fantastic" idea of an earth satellite. The writer spoke of a "sect" which "urges the U.S. to go one better than the ruthless, ghoulish doctrine of the Hitler marauders, which in the end proved so fatal to themselves...the Nazi bombardment of London with V-2 weapons proved how futile such attempts are. And nothing can be altered by increasing the range and scale of destruction...the argument...that intercontinental missiles will be a 'grand strategic weapon' is, from the military point of view, a wild utopia. Actually, it is a piece of deliberate bluff, an attempt at extortion by intimidation." Writing in *New Times*, 7 November, 1949, after the Soviet atomic explosion G. Tarle referred to "the madman Forrestal's idea of an earth satellite" as an "instrument of blackmail."

6. In the light of our assumptions, the focusing of foreign attention upon the military potentialities of the satellite would appear to be undesirable. Neither a short-range exaggeration of United States military might, nor the reinforcement of the image of a United States pursuing fantasies of global destruction machines is advantageous from a psychological and moral point of view. Our publicity about the satellite should, then, seek to counteract these effects as much as possible.

7. This might be achieved in various ways. For instance, one could decide to start informing the public about the project long in advance of the launching. This would make it possible to establish the "peaceful," nondestructive nature of the satellite and to forestall sensation-mongering and speculation. This procedure, however, would tend to minimize, not only the undesirable, but also the desirable effects of a "sensational" launching. The impression of a remarkable technological advance achieved by the

United States would be blunted together with the undesirable impression of the creation of a new 'super-weapon.'

3. Moreover, it is likely that even if announcements are made prior to the launching, speculation about the possible uses of the satellite will be rife: we may give all specifications of the satellite and convince the public that it carries no warhead, but this will still fail to prevent all speculation about possible future warlike uses. People will remember that the first airplanes played no military role, and anticipated an analogous development of the satellite. Moreover, few people will believe that a satellite will be made and launched purely for purposes of experimentation and study. The public will wonder what the real use of the instrument will be, and for reasons which will be discussed later, it seems inadvisable to make advance announcements specifying the actual intended use. Advance publicity, then, also seems to have its drawbacks.

4. Decisions about publicity must take another problem into account: the extent to which secrecy about the operation can be maintained, if necessary. This depends to a great extent on the choice of a launching site. If the location is in the territory of a friendly country, a public announcement about the nature of the experiment must be made as soon as large-scale operations, recognizable as preparations for the launching of some kind of missile, are begun. For it is clear that we cannot embark upon such operations without telling the government of the country involved: thus, too many people will share in the secret, making leaks all too likely. Moreover, preparations on a large scale cannot be hidden from enemy agents, who may then publicize *their* version of what is going on before we say anything. If a launching site on a remote Pacific island is chosen, secrecy can presumably be maintained as long as desired.

10. Theoretically, it would be possible to keep the satellite 'secret' even after its launching, by painting it black and restricting radio communications to the times when the vehicle is over friendly territory. In this case, outsiders would be unlikely to spot it and make a correct estimate of its nature. As long as this secrecy lasts, the satellite cannot affect the 'public image' of the United States, and no political problems will arise in connection with it.

The question whether a 'black' (indefinitely secret) satellite is preferable to a 'white' (deliberately publicized) one cannot be settled here: it depends in part on the probability with which secrecy can be maintained about it after we begin to use it for the transmission of intelligence data. In the subsequent discussion we shall assume that no attempt will be made to keep the satellite secret after launching.

11. In this connection, the question arises whether secrecy should be maintained until the launching is accomplished, or whether advance information about the satellite should be issued prior to the launching. Another question is whether advance publicity should merely preannounce the launching of the satellite at some unspecified date, or whether the launching itself should be preannounced. Finally, we have to consider how much to disclose, and from what sources.

On these points, we may formulate the following tentative conclusions:

Complete secrecy, followed by a sudden revelation of the accomplished fact of launching, would maximize the "sensation" of the satellite and emphasize United States technological prowess, but also reinforce the image of a United States hankering after "global," "absolute" weapons.

Appropriate advance publicity would tend to blunt the sensation: it also would make for continuous (but not panicky) speculation about further "fantastic" advances in military technique and in space travel. There are some good reasons for preferring a certain measure of advance publicity to sudden revelation of the accomplished fact. It is true that the latter information policy would produce a stronger and more dramatic impression of United States technological strength, but this 'surprise' effect would necessarily be short-lived. There is no reason to assume that the initial sensation would result in a higher estimate of United States capabilities in the long run. On the other hand, certain other effects of a surprise announcement may leave lasting traces—particularly an image of unpredictability and provocativeness. It seems desirable for the United States to avoid being looked upon as a power more and more leaning toward the practice of producing theatrical surprises in the international field.

12. The desirability of some advance publicity does not mean that the date of the intended launching has to be made known to the public in advance. There may be urgent security reasons for keeping the date itself secret and announcing only the accomplished fact (public opinion having been prepared for it in advance). This course would also minimize the bad impression that would be created by any technical breakdown.

13. As to the timing of the advance publicity, it would seem advisable not to make announcements too long ahead of the actual launching. Too long a preparatory period would merely increase the volume of speculation about the possible use of the instrument and its imagined destructive effects.

14. The extent of disclosure—As to the content of the announcements made, two points seem to be fairly obvious. Firstly, emphasis should be put on the scientific and technological achievement which a successful 'artificial moon' represents. Secondly, it must be stressed that the satellite carries no warhead and cannot be considered as a weapon.

While these points seem to be unproblematical, the decision as to whether the possible intelligence use of the satellite should be mentioned in publicity (before or after launching) is a difficult one. For reasons which will be clear as this analysis proceeds, it would seem desirable not to publicize the fact that the satellite carries television apparatus capable of transmitting images of terrestrial objects. It is very doubtful, however, whether secrecy on this point will be feasible. It seems to be generally true that in democratic societies, major facts about technological advances cannot be withheld from the public. Even in the atomic field where considerations of security are maximum, there is constant public discussion of the general nature and capabilities of nuclear weapons. We must accept the fact that a scientific and technological feat of the magnitude of a satellite vehicle will generate great pressure for information which cannot be ignored. Hence, in planning publicity, we must be prepared for a situation in which it will not be possible to keep the television feature of the satellite secret. If this turns out to be the case, the best policy seems to be to stress the experimental nature of instruments in, and communications with, the satellite.

The question might be asked whether publicity about the satellite should not be intentionally misleading beyond the withholding of certain details. It might be worthwhile to look into the possibility of "deceptive" uses of the satellite. Some possibilities along these lines will be mentioned later.

14. Source of publicity - The first question to settle is whether initial announcements and subsequent major press releases should emanate from military, government, or private sources.

Since it seems desirable to minimize the warlike aspect of the instrument, it would appear that publicity should be handled in the main by the scientists in charge of the project. In any case, the public and the press will turn to them for information, and it would be unrealistic to assume that they could be by-passed and all information channeled through official sources. This is one of the reasons for making a relatively low estimate of the secrecy that can be achieved. While the basic inclination of officials and military people is to keep disclosures about "hot" developments at a minimum, scientists tend to feel that the knowledge developed by them should be disseminated. They want to minimize "secrecy" rather than "disclosure," and their ethos is definitely inimical to anything amounting to misinformation.

A further question is whether publicity should be restricted to "handouts," or whether journalists are to be given access to "declassified" material they can use in their own way. On the whole, the latter method seems preferable. Past experience shows that United States journalists may be relied upon to go along with official disclosure policy if they are given access to the facts together with clear indications of what has to be kept "off the record." In deciding the question whether the press should be invited to witness the actual launching operation, risks must be weighed against advantages. One of the risks is the possibility of malfunctioning of the technical apparatus; if this happens, an awkward situation would be created if representatives of the press were present. On the other hand, personalized accounts by press representatives would be preferable to impersonal official communiques, in case the launching is successful. Even if the press is invited, however, the date of the launching may be kept secret for security reasons. With reputable journalists, the risk of leakage would seem negligible.

15. It is impossible to make a detailed forecast as to the way in which the launching of a satellite vehicle (or of satellite vehicles) will affect the picture of the United States entertained by various foreign audiences. The preceding considerations, however, permit the following tentative conclusions:

- (a) Complete secrecy followed by a sudden announcement of the accomplished launching, great parsimony in giving out information about the device, and attempts to concentrate all information within official channels would tend to generate mistrust and fear of United States intentions.
- (b) A more liberal policy of publicity, based upon confidential contacts between the scientists in charge and the organs of the press, and limited only by well-defined principles of security, appears to be most practicable as well as most conducive to achieving the essential objectives of United States information policy.
- (c) Effects upon the Soviet audience (policy-makers) would differ from those upon friendly and neutral audiences, largely in that estimates of aggressive intent behind the development and use of the instrument would be higher.

IV. THE SATELLITE AS A POLITICAL PROBLEM

A. Secrecy and Sovereignty

1. Now we shall turn to the possible political consequences of the use of the satellite. Such consequences are to be expected if potential opponents and allies discover that the satellite is being used as a novel instrument significantly enhancing United States capabilities in some strategically relevant field, such as reconnaissance.

If the satellite is actually seen as shifting the balance of power in favor of the United States, it is to be expected that the opponent will try to minimize this shift by appropriate counteraction. The nature of this counteraction will depend first on the opponent's estimate of the threat involved, and, second, on his capabilities for appropriate counteraction. In other words, the greater the threat is assumed to be, the more drastic will the response be; and this 'drastic' response may be either maximally belligerent or maximally yielding, depending on estimates of comparative strength.

2. We may assume that the Soviet leadership will consider the actual or possible use of novel reconnaissance facilities against it as a major threat. As long as there is uncertainty about these capabilities of the satellite, a general state of anxiety and frustration will probably prevail, and strenuous efforts will be made to determine those capabilities.

3. The Soviet attitude toward secrecy differs in some important respects from the attitudes of other governments. Outside the Soviet sphere, the tendency is not to inhibit free access to, and dissemination of, information, unless there is some cogent ground for maintaining secrecy; whether large or small, the area of secrecy is limited. This limited area includes, in the first place, items of differential technical knowledge: the intention is to protect some monopoly of knowledge and know-how. In addition, governments outside the Soviet sphere also withhold information about their planning of political action and about pending political moves. In general, political and defense secrets are "top level" secrets: they concern advanced technology and details of important policy decisions. In the Soviet sphere, however, the tendency is to inhibit access to every kind of information concerning the country, whether trivial or not. The government is interested in presenting to the outside world a picture of life and conditions suited to its purpose. Any attempt to supplement this information by independent observation is seen as an unfriendly act, equivalent to spying. Those who want to see for themselves rather than accept the government's word about everything are considered malevolent and aggressive. The general pattern is that nothing should be said about the country unless some political purpose can be served by what is said. If the outside world gets hold of any unprocessed, unexpurgated information, it is sure to use it in some damaging way. This is, of course, especially true of military information. Information of this kind, whether "top level" or trivial, is seen as a weapon which foreigners must be prevented from acquiring. The Soviets are, of course, aware of the "axiom" that it is desirable to present to the others an image of maximum strength; hence,

public displays, giving a general impression of strength, are part of the Soviet practice. But they consider it vital to maintain secrecy both about the exact limitations of their strength and about the ways in which strength is being generated.

Fear of loss of secrecy is constant and intense. A picture of the outside world as engaged in penetrating Soviet secrets is likely to be highly anxiety-provoking.

4. This attitude is reflected by the following decree of the Presidium of the USSR Supreme Soviet, promulgated on January 12, 1950:

In view of petitions from the national republics, trade unions, peasant organizations and cultural representatives urging amendment of the decree on abolition of capital punishment, to make that decree inapplicable to traitors to the Motherland, spies and subversive diversionists, the Presidium of the USSR Supreme Soviet decrees...that the death penalty, as the highest form of punishment, may apply to traitors to the Motherland, spies and subversive diversionists, as an exception to the May 16, 1947, decree...on the abolition of capital punishment....

5. It is characteristic of the Soviet attitude towards secrecy that it maximizes both the range of secrecy and the importance of its preservation. Secrecy is not a circumscribed objective among many others, but one which is connected with the central value of political life: the sovereignty of the state. It is to be expected that attacks upon secrecy will be construed as attacks upon Soviet sovereignty.

6. We may consider briefly the problem of reconnaissance by the satellite from the point of view of existing international law. Two points are of interest in this connection: the first concerns sovereignty over the air space above a country; the second, the possible limitation of sovereignty to an 'air space' thought of as extending only up to a certain maximum altitude.

7. Sovereignty over 'air space' is a well recognized principle of international law.

It is a well established principle as expressed in Part I, Chapter I, Article 1, of the Convention on International Civil Aviation, in the Preamble, that 'every state has complete and exclusive sovereignty over the air space above its territory' (Rowland W. Fixel, *The Law of Aviation*, The Michie Co., Law Publishers, Charlottesville, Va., 1948, p.66).

The principle is also embodied in United States municipal law. In the words of the Civil Aeronautic Act of 1938, 'the U.S.A. is hereby declared to possess and exercise complete and exclusive national sovereignty in the air space above the U.S., including the air space over the inland waters, and the air space over which by international treaty or convention the U.S. exercises national jurisdiction' (*ibid.*, p.67).

8. Notwithstanding this reservation of national sovereignty over air space, the Convention on International Civil Aviation (1944) recognizes 'freedom of the air' in the sense that the contracting powers undertake to grant the right of 'innocent passage' over each other's territories, subject to certain restrictions. In particular, the Convention authorizes each signatory to prohibit passage over certain areas 'for reasons of military necessity or public safety' (Article 9). The use of 'photographic apparatus' in aircraft may be 'prohibited or regulated' (Article 36). 'State aircraft' (meaning government-owned, particularly military aircraft) may not fly over foreign territory without 'authorization by

special agreement or otherwise" (Article 3).

9. The Soviet Union has never adhered to the Convention and is apparently unwilling to recognize the principle of "freedom of the air" in any form.

International law as it relates to territory has been the concern of the U.S.S.R. since the war. The attempt by the United States to establish in international law freedom of the air has been resisted. The U.S.S.R. has argued for retention of the current view of international law that the air space above land is as much territory of the state as the land itself. (Footnote: See Chernomordik, E.Y., *Air Space in International Law*, *Izvestiya Akademii Nauk SSSR, Otcetenie Ekonomiki i Prava*, 4/1948, p.243). The Air Code of the U.S.S.R. has long held to this principle. Efforts of the United States to change this principle by treaty have no support from the U.S.S.R. (J.N. Hazard, *The Soviet Union and International Law*, in *Soviet Studies*, I. 3, January 1950, p.196).

It may be noted in this connection that the United States apparently does not reject the principle of sovereignty over air space as such, but merely seeks to reconcile it with that of free passage by civil aircraft over foreign territory.)

10. While the existing laws and conventions uphold each power's sovereignty over the 'air space' above its territory, they do not specify how far 'air space' may be held to extend in the vertical dimension. Legal thinking in the United States leans toward the view that outer space beyond the atmosphere does not come under the national sovereignty of any power. Thus, Fixel says that "the upper stratum of air beyond certain limits appears to be unconnected with a claim to sovereignty therein as it is beyond any region that may be patrolled or controlled" (*op. cit.*, p.73). It is very doubtful, however, whether the USSR would accept such a "vertical" limitation of sovereignty; and in any case, it would certainly not regard the passage of any vehicle in the outer space over its territory as "innocent" if it were demonstrated that it was being used to perform acts which in themselves infringe upon sovereignty.

11. We may assume that satellite operations designed to gather visual information in Soviet territory, if they become known to the Soviet leaders, will be construed by them as a "consummated act of aggression." This reaction is likely to be verbalized in legalistic terms. The question is, of course, what counteraction the Soviet government may make in response to this "aggression."

3. Possibilities of Soviet Counteraction

1. Legal concepts of "sovereignty" and "consummated violation of sovereignty" fulfill an important political function. They provide the policy-makers of any country with a criterion for distinguishing "tolerable" from "intolerable" infringement of their interests. At the same time, they also supply a basis on which the population at large may be rallied to a policy of war. There have been many historical examples both of actual and unmistakable violations of sovereignty which prompted a country to declare war, and of warlike initiative on the part of a country being justified by reference to a fictitious "violation of sovereignty" committed by the victim. (The latest example of the latter is, of course, the Communist attack upon South Korea.)

2. The general nature of the sovereignty concept is that it involves an unconditional commitment to act in certain specified cases. It seems to be a general rule of action for sovereign governments that no consummated

violation of their sovereignty can be tolerated by them. This rule, however, may be interpreted in various ways. One possible interpretation is the following: In case of violation of sovereignty, counteraction may be either violent or nonviolent. Nonviolent counteraction may take the form of negotiation or litigation; violent counteraction normally is war. The former course will be adopted in cases where the infringement is passing or trivial; the latter, where it is final and irreparable. The second interpretation of the rule may be formulated as follows: counteraction normally has to be violent, i.e., the government whose sovereignty has been infringed upon has the right and duty to take immediate action against the offender. Such violent counteraction, however, need not take the form of total war: if the infringement is a passing and isolated action, the counteraction may be limited to the removal of a local threat. United States practice seems to be closer to the first pattern, Soviet Union practice to the second. In certain situations, the United States has adopted a policy of 'localized armed action short of war' (cf. President Roosevelt's 'fire on sight' order to convoy ships), but such policies were generally felt to be a prelude to war. On the other hand, Soviet Russia has initiated or instigated certain violent actions in the 'cold war' period on the assumption that they would not lead to total war.

3. From this point of view, the satellite would put the Russian leadership in an awkward situation. It would represent, in their view, a consummated attack upon sovereignty; but the instrument itself would be outside the range of effective violent local counteraction. Moreover, the infringement would be quasi-permanent rather than transitory, so that it would be impossible to ignore it. In such a situation, the usual Russian response to a specific 'breach of sovereignty'—violent action short of all-out war—would be impracticable. What will the Soviet leaders do under such circumstances?

4. It cannot be assumed that they will simply ignore the incident and refrain from any counteraction. On the other hand, it seems also very unlikely that they will start total war in retaliation. For a decision to go to war will not be taken, in all probability, unless the Soviets deem it imperative on general grounds. The probable reaction, then, will lie somewhere between these two extremes.

5. One possible type of counteraction would be litigation. Although the USSR is not a party to the Statute of the International Court of Justice it could institute proceedings in that Court to obtain an injunction against the United States to cease and desist from further actions 'violating Soviet sovereignty.' The mere fact that a satellite vehicle, launched under United States auspices, travels over Soviet territory would, in all probability, not be sufficient to establish breach of sovereignty; but if evidence is presented concerning the gathering and transmission of photographic data, the legal situation would be more complicated. It cannot be foreseen with certainty how the Court would evaluate the evidence presented, nor how it would interpret the principles governing 'air space.'

6. The Soviet government might take countermeasures other than litigation. Let us consider, for instance, the question of the location of the ground installations (recording stations) that have to be used in connection with the satellite. Unless the satellite is equipped with machinery for delayed transmission, these installations cannot all be located in United States territory; they must be maintained reasonably

close to Soviet Russia. If the stations are in the territory of comparatively weak nations, the Soviet government (which could discover the stations and ascertain the function they serve) could put diplomatic and political pressure upon the governments in question, trying to arouse fear of the possible consequences should they persist in cooperating with an 'act of aggression.' Such pressure might have a certain amount of success. We must remember that there is widespread fear in Western nations lest some 'aggressive' American move, in which they are obliged to cooperate, would expose them to the danger of retaliation. In the hypothetical case of discovery of recording stations, the Soviet could start a 'war of nerves' to exploit these fears.

It cannot be foreseen with certainty what effect such a 'war of nerves' would have. But we cannot rule out the possibility that it might achieve a certain measure of success. Public opinion in the countries affected might be aroused and there might be strong demands for stopping the operation. There would be some danger of sabotage.

2. The Soviets might also threaten to destroy the stations by direct attack, and eventually do so in fact. This would constitute an act of war, of course; but it is somewhat doubtful whether, in case such an attack does occur, the situation will be ripe for an all-out war to be declared in retaliation.

3. Some of these consequences could be avoided if the receiving stations were not located in friendly territory but on United States ships placed at suitable points. Virtually all interesting points in the Soviet Union could be covered by ships placed near, say, Norway, Turkey, Formosa, and Sakhalin, with only one ground station somewhere in Northern Pakistan. This arrangement would reduce the political risks mentioned to a minimum. The only real risk, then, would consist in armed action against the stations themselves. We must reckon with the possibility of such 'acts of war,' both because according to Soviet doctrine 'violation of sovereignty' is an act of aggression that warrants armed counteraction, and because the Soviets do not believe that any direct act of violence inevitably implies total war. In fact, it cannot be stated in advance whether actual attacks upon stations (whether placed on ships or in friendly territory) could or would be considered a *casus belli*. The future trend of international relationships may well be such that a certain amount of violence will be absorbed by all participants; the line dividing 'peace' and 'war' may well be blurred.

9. In planning a satellite program, then, we have to reckon with the possibility of strong Soviet counteraction, even including physical attack upon receiving stations. It would appear desirable to map United States policy in advance, in anticipation of such counteraction. Some questions that will arise are: What steps should be taken to prepare litigation? How can a Soviet "war of nerves" be neutralized? How could the stations be protected? Would a physical attack lead to an ultimatum to Soviet Russia?

C. The Satellite as a Political Weapon

1. To answer these and similar questions, we must have a clear picture of the military and political worth of the satellite itself.

2. In so far as its military worth is concerned, it may be pointed out that better intelligence about the location of major Soviet installations is a vital necessity. Our knowledge of this at present is extremely

efficient; this seriously affects the chances of success of strategic bombing activities. It is enough to point out the need for locating as exactly as we can the strategic and tactical air fields of the Soviets, as well as certain other high priority targets. Visual reconnaissance of the type promised by the satellite would, then, if successful, undoubtedly yield a considerable payoff.

2. We may add to this that successful reconnaissance operations of the kind envisaged would also result in a significant political payoff. Secrecy regarding the location of major war installations undoubtedly plays a considerable role in Soviet war planning. What would happen if the Soviet leaders were to realize that this secrecy had been lost? Under certain circumstances, such a realization could act as an additional deterrent to war. This would be an important political payoff. The satellite could, in other words, reinforce the deterrent effect already provided by atomic stockpiles and strategic bombers, by enhancing the expected effectiveness of air strikes.

3. How great would this effect be? Unfortunately, no instrument or combination of instruments is a guaranteed deterrent. The Soviets may go to war if they think they have great over-all superiority which can bring them success if they strike without warning, particularly if they also conclude that any alternative policy would leave them worse off. We cannot be sure that their estimate of the mutual strength relationships and of the over-all situation will not be of this kind at some time, regardless of our rearmament and reconnaissance efforts. But as long as 'deterrent' instrumentalities possessed by the United States retain their effectiveness, successful reconnaissance by means of the satellite would add to this deterrent effect.

5. It may be argued that 'containment' and 'determent' cannot work indefinitely, and that war cannot be avoided in the long run by applying such methods alone. This argument implies that we have to think about some 'genuine settlement' of the outstanding issues between the United States and the Soviet Union, rather than merely relying on the indefinite application of 'containment' methods. As things are now, however, the chances for a genuine 'settlement' are practically nonexistent. The major goals and principles of the two antagonistic powers are too far apart to permit us to hope for a compromise by the often advocated method of round-table discussion. A 'settlement' presupposes a radical reorientation on the part of one or the other of the two antagonists, involving readiness to make major concessions short of complete surrender. Admitting that, under present conditions, neither of the two antagonists could or could effect such a reorientation, the question is under what circumstances they might be ready to do so. Leaving the question of a reorientation on the part of the United States out of the discussion, we shall ask, then, whether willingness to make major concessions short of surrender is a conceivable course for the Politburo, and under what circumstances.

6. The primary requirement for such a decision on the part of the Politburo is a substantial upward revision by them of the margin of superiority held by the United States. Another requirement is confidence on the part of the Politburo that by "yielding" on major points it would nevertheless avoid risk of complete elimination. Whether any combination of policies and circumstances could result in the simultaneous fulfillment of these conditions cannot be discussed here. It may be pointed out,

however, that just as loss of secrecy would increase the effectiveness of deterrence, it would also contribute to the effectiveness of direct political pressure upon the Soviet Union. If we can hope to impose any "settlement" by means of pressure, the satellite would be one of the political weapons we could use to this end. Since complete secrecy is one of the factors upon which the Soviet leadership bases its estimate of the strength relationship between the United States and the Soviet Union, any major loss in this respect may lead to a significant upward revision of relative United States strength and thus increase readiness for making concessions. (On this, see also par. 3 below.)

1. The political payoffs discussed so far have been estimated on the assumption that the Soviet leadership would be clearly aware of a considerable loss of secrecy due to reconnaissance by satellite. It must be recognized, however, that the Soviet leaders may be expected to reach definite conclusions to this effect only after a fairly protracted period of initial uncertainty. It is likely, indeed that the Politburo will not be in the dark for a long time as to the fact that the United States intends to use the satellite for intelligence purposes. But they cannot be sure as to the results actually achieved or attainable without going through a rather protracted process of monitoring and evaluation.

3. From our point of view, it seems desirable to prolong this period of uncertainty as to the results achieved by the satellite until very substantial reconnaissance success has actually been achieved. If, during the period of uncertainty, the Politburo leans toward overestimating the capabilities of the satellite, it might be possible to exploit these fears to exact political concessions. If, on the other hand, the Politburo tends to underestimate the satellite, a considerable political payoff may be achieved by a sudden, dramatic revelation of the extent of loss of secrecy already achieved or inevitably in the offing. Such a revelation, for instance, might lessen Politburo resistance to international inspection of atomic installations; after all, inspection would not make too much of a difference if the major secrets are lost anyway.

2. Methods of maximizing uncertainty and deception in connection with the satellite operation should be carefully explored. Possibilities in this direction seem to be limited (see Section III above), first, because the technological and scientific achievement itself "imposes" a certain amount of publicity, second, because the execution of the project would seem to require some degree of international cooperation, and, last, because in the long run it seems impracticable to prevent the opponent from detecting signals. But within these limits, a certain amount of secrecy or deception seems possible, at least temporarily. For instance, there may be a period during which we can collect material without the Soviet government knowing that such an operation is going on. As long as this is the case, we obtain a military (intelligence) payoff, without also obtaining a political one. Suppose the Soviet government were allowed to find out that major secrets about the location of important installations had been obtained--without being able to learn about the channel of leakage? The effects of loss of secrecy then would materialize, with the additional effect of suspicion and fear about the existence of a potent spy organization. It seems rather difficult to put such a program into effect, but any opportunities that may present themselves in this direction should be seized. Technique of planted "leaks" and of overt publications might be used to produce such effects.

10. We may conclude from the preceding analysis that a successful intelligence operation using a satellite would yield an important political payoff, possibly culminating in greater Soviet readiness to refrain from attack or even to yield to pressure. But precisely because the potential political effects are so momentous, we must reckon with the possibility of vigorous Soviet attempts to interfere with the operation and thwart it before it can produce complete results. This raises the question of how the risks inherent in possible Soviet counteraction could be minimized. This question will be taken up in the concluding section of this paper.

I. A POSSIBLE PLAN OF ACTION

1. Our objective is to reduce the effectiveness of any Soviet counteraction that might interfere with the satellite reconnaissance operation before significant intelligence results are secured.

2. Perhaps the best way to minimize the risk of countermeasures would be to launch an "experimental" satellite on an equatorial orbit. Such a satellite would not cross Soviet territory and, hence, would not provide the "consummated aggression" on which effective counteraction could be based. This may be qualified to some extent by the Politburo's tendency to equate potential aggression with actual, consummated aggression. One of the Politburo's principles of political action may be summed up in the phrase *principitis obsta*: maximum counter-aggression is indicated whenever a potential threat is perceived; actual aggression need not take place to provoke such counter-aggression.* Thus, if the Politburo were to consider the equatorial satellite as the forerunner of another one, covering Russian territory, it would probably consider every feasible method of removing the threat. Nevertheless, the equatorial satellite would reduce the risks inherent in Soviet countermeasures. First, it is somewhat doubtful whether the Politburo would discover the nature of the eventual threat. Second, even if it did, it would probably refrain from direct action against ground stations, since such action would involve great technical difficulties and political complications. It is to be foreseen, however, that any satellite experiment would call forth a vigorous reaction on the part of the Soviet government at least on the verbal level.

3. A drawback involved in this course is that the Soviet government might start possible technical countermeasures, such as extensive camouflaging, to defeat the reconnaissance use of the satellite before any data have been obtained. It is, however, somewhat questionable whether large-scale camouflaging of all or most important installations is feasible; the costs of a comprehensive program of this kind might be prohibitive. Moreover, we have to remember the point made above: that in any case, the payoff during the testing and training period would be small. The question is how long it will take to complete the preliminary operation and start the reconnaissance work itself. The threat of camouflage must be taken into consideration in this connection.

4. Reconnaissance data must be up-to-date to be of operational value; hence it would be advantageous if the operation could go on indefinitely after war has broken out. The vulnerability of the recording bases presents an important problem in this respect. It would be best if "delayed transmission" techniques could be used, making it possible to locate the bases far from Soviet territory. If this is not feasible, one might consider the use of mobile bases to reduce vulnerability to attack. (As stated above, the possibility of attack even in peacetime cannot be ruled out; hence provision must be made for the defense of the stations from the outset.)

5. There is a possibility that the launching of the satellite would induce the Soviets to start a satellite program of their own, possibly for reconnaissance purposes. But there is no difference, in this respect, between our launching the first satellite over the equator or on an oblique orbit; moreover, it is unlikely that the Soviets would embark upon such a program. (The reconnaissance payoff for the Soviets would probably be very

small, owing to the ease with which they can obtain information about United States targets in other ways.

There are serious political problems to be considered in connection with the launching of the satellite. The operation would have to be carried out mostly in territories not under United States sovereignty. This raises legal questions connected with "air space" sovereignty (see III, 5-9 above). Although the air space actually traversed by the satellite may be considered as removed from the jurisdiction of any particular power, it would still seem necessary to make sure that no objections will be raised on this score. This applies still more to any experimental reconnaissance work. It will probably be necessary to limit the recording operation to selected nonstrategic areas, and this has the disadvantage that it would not permit us to find out exactly what the satellite could really "see" in the way of strategically relevant topographical details. And even if the test reconnaissance is limited to "innocuous" details, the fact that such reconnaissance is being conducted can be exploited by a demagogic opposition in the countries involved. For this reason, it seems unlikely that Latin America could serve as "test targets." The best terrain for the test operation seems to be Central Africa, as well as the islands of the South Pacific.

2. Preliminary use of the equatorial orbit would permit testing, not only of the satellite's capabilities, but also of its impact upon public opinion. From this point of view, too, the avoidance of acute political conflict seems to be best. For in this way, attention will be mainly directed to the technological feat as such, as an illustration of America's technological supremacy; there will probably be considerable speculation about possible weapon developments, but no panicky anticipation of immediate complications—provided the public understands the limitations of the satellite's area of coverage. One of the objectives of our information policy would then be to counteract exaggerated estimates of the "global" impact of the vehicle. Observation of the actual response will be valuable for the shaping of future policies.

3. If results obtained during the test period are satisfactory, the decision may be taken to launch a second "work" satellite. How this can be done best must be determined in the light of the experience gathered. It would be distinctly advantageous if the second satellite could be black, but it seems unlikely that it could be kept secret indefinitely. Hence the risk of detection and possible counteraction must be carefully weighed against the possible payoff before the decision is made. The optimum timing seems to depend, among other things, on the international situation. If war appears imminent, nothing will be gained by delaying the operation. If the Soviet government relaxes and plays a "defensive" or "conservative" diplomatic game, it may be preferable to perfect the instrument and the methods of its use before starting the reconnaissance operation itself.

4. The preceding discussion suggests the following schedule of operations as most likely to minimize the risk:

- (a) Preliminary diplomatic soundings about the equatorial satellite, covering, among other things, ground targets for experimental reconnaissance. Negotiations to be strictly confidential.
- (b) Preliminary publicity, stressing the scientific aspects of the experiment.